

## THE HISTORY OF MAMMALOGY IN THAILAND

Kitti Thonglongya<sup>†</sup>

Thailand is a meeting place, not only of people, but also of wildlife. It shares some of the elements of the fauna of surrounding areas, i.e. India, China, Indochina, and Malaya. The resulting mosaic of wildlife is fascinating to ornithologists, mammalogists, botanists, herpetologists, ichthyologists, and others. However, although the study of birds and of mammals of Thailand started at the same period, birds have received much more interest, and the avifauna of Thailand is well known (DEIGNAN 1963; LEKAGUL 1968), whereas, by contrast, mammals in this country remain relatively little known.

Professor John Harrison of the University of Singapore (personal communication) once said, "Unfortunately, there is no work on the mammals of Thailand as such; perhaps because they are covered by faunas of adjacent areas; perhaps because Thailand lacks a national collection or museum of animals which focuses interest to the people..." But a national collection has now been started, at the Applied Scientific Research Corporation of Thailand, and plans for a museum have been drawn up. This will hopefully serve as an introduction to the mammals of Thailand, focusing interest and further work on the unique combinations of species found in the diverse habitats of the country.

A considerable amount of specimens collecting has been conducted in the past in Thailand, but many of the results of these collections have not been published. When they were published, they were often published in obscure journals not generally available to Thai people. There have been many schemes of nomenclatures, often more confusing to the reader than enlightening. Although the literature on hand is not complete, this account will serve as a guide to the history of mammalogy in Thailand for future workers in this field.

---

<sup>†</sup> Late Curator of Terrestrial Vertebrates; Centre for Thai National Reference Collections (CTNRC), Applied Scientific Research Corporation of Thailand (ASRCT).



There are two modern checklists of mammals covering parts of Thailand. Chasen's work (1940), covering the Malay Peninsula at least as far north as the Isthmus of Kra, was brought up to date by ELLERMAN & MORRISON-SCOTT (1955). These authors also published (1951) an extensive checklist of the mammals of the Palaearctic and Indian regions, including parts of Thailand. These checklists contain distributions, synonyms, and subspecies, though the bases for such judgement are usually not given, and they provide just the bare beginnings for further research. More extensive works on the fauna of particular countries or areas which are relevant to Thailand include the following: MEDWAY (1969) for Malaya; HARRISON (1966) for Singapore and Malaya; VAN PEENEN (1969) for South Vietnam; TATE (1947) for southern Asia; POCKOCK (1939, 1941, incomp.) for British India (vols. 1 & 2 for Primates & Carnivora); ELLERMAN (1961) added vol. 3 for Rodentia (this series includes Burma and parts of Thailand); ALLEN (1938, 1940) for China and Mongolia.

It seems that a French explorer, P. Tachard (1689), was the first European to report on a Thai animal, listing a white squirrel (probably *Callosciurus finlaysoni*) from "Lonpeen", a village "situated in the extensive forest of Siam". The same animal was again reported by BUFFON (1789, p. 256), which seems to be the first scientific record about a mammal from Thailand. Dr. J.G. Koenig, in Thailand during 1778-1779, wrote about a few mammals that he had seen and collected (translation, 1894). This seems to have been the first collection of mammals for scientific purposes from Thailand.

During 1821-1822, Dr. George Finlayson accompanied Sir John Crawford to Thailand as a surgeon and naturalist for the British diplomatic and trade mission to Siam and Cochin-China. Finlayson collected a considerable number of mammals (as well as other kinds of animals) which he donated to the East India Company Museum in Calcutta and the British Museum (Natural History) in London. The materials from the East India Company was later transferred to the British Museum (Natural History) in London. From this material, T. Horsfield, (1824, unpaginated), described a new squirrel, *Sciurus finlaysoni* (now called *Callosciurus finlaysoni*, probably the same species that was reported by Tachard in 1689) and he mentioned several other mammals collected by



Finlayson from Thailand. Later, in his Catalogue of the Mammals in the East India Company Museum published in 1851, Horsfield listed 23 mammals representing 13 species, all collected and donated to the Museum by Finlayson in 1823.

Dr T. Cantor, a surgeon and naturalists in Malaya, made extensive collections in the Malay Peninsula and published a catalogue of his work in 1846. Although the collections were mainly from the more southern areas of the Malay Peninsula, Cantor also listed no less than 7 species from "Siam" proper. These collections were also donated to the East Indian Company Museum and were later transferred to the British Museum (Natural History). The French naturalist, Henri Mouhot, travelled extensively around Thailand and adjacent areas during 1858-1860 and collected a great many biological specimens which he sent to his friend, Mr. M. Steven, in London. The specimens were eventually purchased by the British Museum (Natural History). The mammals were studied in detail by several people and several new species were described.

Sir Robert Schomburgk came to Thailand as the British Consul during 1869-1871 returned home with a small collection of animals including several mammals, among which was a pair of antlers of a new species of deer described as *Recervus schomburgki* by E. Blyth in 1863; this was the only large mammal occurring only in Thailand and it is probaly now extinct.

In 1868, A. Milne-Edwards of the Royal Paris Museum published *Les Mammifères*, a general work on the distribution of mammals in which he included the species of mammals known to him from Siam. In addition, he reported specimens collected and sent to him by some French collectors including Harmand, Bocourt, and others. Bats collected from Siam and Cambodia by Harmand were studied and discussed by G.E. Dobson (1878 b).

In Blyth's catalogue of mammals and birds of Burma (1875), he recorded a few mammals from Tenasserim and added Siam to their distribution. G.E. Dobson, in his monograph on bats (1876) recorded all skins and pickled specimens from Asia found in the Indian Museum



and British Museum (Natural History). Subsequently, Dobson published the important *Catalogue of the Chiroptera in the British Museum* in 1878, listing again all bats deposited in the British Museum at that time, including some from Thailand.

Mr. A.O. **Hume**, the ornithologist, sent his collectors to the Tenasserim and Malay Peninsula during 1877-1879: One, Mr. J. **Darling**, arrived in Phuket in early 1879 and spent several months collecting specimens, primarily birds. The mammals were donated to the British Museum (Natural History) in 1885, among which Mr. O. **Thomas** (1886) mentioned 6 species.

J. **Anderson** (1881) revised the list of specimens deposited in the Indian Museum and intended to divided his work into two parts since the collections had greatly increased after Horsfield's catalogue (1851). Unfortunately, Anderson died before he finished the second part, which was later completed by Dr. W.L. **Sclater** (1891). Both Anderson and Sclater listed more specimens from Thailand than had **HORSFIELD** (1851).

During 1888-1891, W.T. **Blanford** published a two-volume work on the mammals of British India, including Burma. He included synonymy descriptions, distribution, and habitat, as well as keys to identification. Since many Indian and Burmese species extend to Thailand, the book was also relevant to Thailand.

Dr. E. **Forbes** (edited by Dr. Bowdler **Sharpe**, 1894) mentioned all mammals known to him in *Allen's Natural History Library* vol. 1 & 2.

The American explorer, Dr. William L. **Abbott**, visited peninsular Thailand several times between 1896-1903, and he seemed to be the first American naturalist to visit Thailand. Dr. Abbot collected specimens for the Smithsonian Institution, U.S. National Museum, and his was one of the finest early collections of Malaysian fauna. In Thailand, he worked both on the mainland and on islands off the western coast of the peninsular, north to the Mergui Archipelago of Burma. His material was studied and reported by **MILLER** (1898, 1900, 1903, 1913), and **LYON** (1907, 1911, 1913).

Professor E.L. **Trouessart** published his famous catalogue between 1897-1905 in several editions, and he included 45 species of mammals



known to him from Thailand. Professor Paul **Matschie** published *Die Megachiroptera* in 1899, listing all species of fruitbats from specimens deposited in Berlin, London, Paris, and European Museums.

The British Vice Consul, Mr. T.H. **Lyle**, collected many biological specimens in Nan, Chiang Mai, and other places north of Bangkok between 1897-1901. The mammals were later reported by **BONHOTE** (1900 *b*, 1901, 1902), bats by K. **Andersen**, others by O. **Thomas**, and squirrels by **Wroughton**.

E. de **Pousargues** (1904) reported on many new or little-known species of bats collected by A.J.M. **Pavie** during 1879-1895.

Captain S.S. **Flower** came to Bangkok in 1897, hoping to complete an account of mammals of Siam and Malaya. He listed no less than 160 species from both Siam and Malaya (1900), which was probably the first list which included all known Thai mammals. At that period he mentioned a museum in Bangkok which had exchanged some biological specimens with the British Museum (Natural History).

Nelson **Annandale** and Herbert C. **Robinson** came to the northern portion of the Malay Peninsula during 1898-1900 and collected specimens during the Skeat Expedition for the Tring Museum in England. The mammals were reported by **BONHOTE** (1900 *a*, 1903), who described several new forms. Annandale later became Director of the Indian Zoological Survey and Robinson became Director of the Federated Museums of Malaya. Robinson visited various parts of Thailand many times, accompanied by C. Boden **Kloss**, Curator of the Museum. Both scientists collected a great many specimens of mammals, birds, reptiles, fish, and others, with a primary interest in studying the relationship between the fauna north of the Malay Peninsula and the fauna of the Malaysian subregion.

C. Boden **Kloss**, who later became Director of the Raffles Museum in Singapore, worked independently on Thai mammals and zoogeography and received many specimens from Mr. K.G. **Gairdner**, who collected while he worked for the Thai government as an Engineer of the Irrigation Construction. Kloss described many new species, most of which are



now considered subspecies at best; however, the work of ROBINSON & KLOSS (1914, 1915 *a*, 1915 *b*, 1922, 1923); KLOSS (1915, 1916 *a*, 1916 *b*, 1917 *a*, 1917 *b*, 1919 *a*, 1919 *b*, 1921); KLOSS & CHASEN (1930) remain the most significant work for those interested in Thai mammalogy.

When Robinson retired from the Federated Museum in 1926, he took with him a large collection of mammals from the Malay Peninsula, hoping to use this material as the foundation of a book on the mammals of this region. He died after only a little work was completed. Kloss had agreed to continue this work, but for unknown reasons was unable to do so, and the collection was later given to the British Museum and was finally reported upon by John Edward Hill in 1960.

F.N. Chasen, who replaced Kloss as Director of the Raffles Museum in 1923, also worked a great deal on mammals from Thailand, visiting northern and peninsular areas, including the islands off the western coast and described many new varieties. His *Handlist of mammals of Malaya* was published in 1940 and is still a standard work of this region, though it has many ideas differing from the modern viewpoint.

Much of the material collected by Robinson, Kloss, and Chasen was sent to the British Museum (Nat. Hist.), but a significant part of the collection was kept in Kuala Lumpur and Singapore before World War II. Before the Japanese occupied Malaya, the Federated State Museum in Kuala Lumpur was bombed and all specimens were damaged or burnt. Chasen tried to take the valuable specimens with him when he fled Singapore during the Japanese invasion, but his schooner was sunk in the straits of Malacca. Chasen and all of his specimens, including some types, were lost, bringing to a tragic conclusion the work of Robinson, Kloss, and Chasen.

Although he never visited Thailand or Malaya, Dr. Knud Andersen published many articles concerning bats from this area, based on the collections in the British Museum (Natural History). His important paper on fruitbats was published in 1912, with numerous papers from 1905 to 1918.

Count Nils Gyldestolpe of Naturhistoriska Riksmuseet, Stockholm, accompanied the Prince of Sweden as a royal guest during the festival



celebrating the coronation of H.M. King Maha Vajiravudh (King Rama VI) in late November 1911. Gyldenstolpe spent nearly two years in Thailand after the coronation festival and collected natural history specimens for the Swedish Museum. He returned to Thailand again during 1914-1915 and worked extensively throughout the country. Several papers resulted from his work, the most important one being published in 1916. He also published a list of the mammals known to inhabit Thailand (1919), and in this paper he included 304 species and subspecies, many of which are invalid since he had accepted them uncritically from the older literature. His specimens are still kept at the Naturhistoriska Riksmuseet, Stockholm, and among them are two species (*Tupaia siamensis* and *Rattus sakeratensis*) which have not been collected by anyone else, and remain unsolved questions in the nomenclature of mammalogy of Thailand.

Dr. Hugh M. Smith seems to be the second American naturalist, after Abbott, to come to Thailand. He arrived in 1923 and spent 11 years as the Advisor in Fisheries to the Thai government. Smith collected all kinds of zoological material and we have no idea how many specimens, all of which are still kept in the Smithsonian Institution, Washington, D.C. Most of the material has not been studied, except for the bats, which were reported by Harold SHAMEL (1942). Shamel described several new forms and several new records from Thailand. TATE (1943) proposed *Rhinolophus coelophyllus shameli* from Smith's collection from Ko Chang (Chang Island); this was shown to be a full species later by HILL & THONGLONGYA (1972).

The Zoologisk Institut, Copenhagen, Denmark, also possesses collections which have not been studied. These are from C.J. Aagaard, who collected mammals in the North and South during 1925-1927; Drs. Benson, A. Gerke, and T. Mortensen, collected many specimens, primarily bats, from the South-East during their expedition to Thailand between 1931-1935.

During the same period, a few mammals were collected by Lowe and Vernay-Cutting while on their expedition to the Tenasserim in 1930. They worked from Moulmein in Burma, through the Tenasserim and



ended up in Bangkok. Their collection, including the very seldom-collected Pigmy Shrew (*Suncus etruscus*), is now deposited at the American Museum of Natural History, New York.

Baron Rodolphe **Meyer de Schauensee** visited Thailand three times, primarily to work on birds. However, he also collected other animals for the Academy of Natural Sciences of Philadelphia, with part of his collection reported by **Osgood** (1934).

As Superintendent of the Zoological Gardens in London and Curator of Mammals at the British Museum (Natural History), **R.I. Pocock** published many articles concerning mammalian specimens deposited in the museum as well as live specimens at the zoo, and many of his papers are relevant to Thai species, based on collections made in Thailand and adjoining countries. His most important work was the *Fauna of British India including Ceylon and Burma*, volumes 1 & 2, on Primates and Carnivora. Pocock died before he started the third volume, but this work was later continued by **J.R. Ellerman**, who published (1961) the volume on rodents in two parts, now called *Fauna of India*.

The well-known ornithologist, **Herbert G. Deignan**, first came to Thailand as an instructor at the Prince Royal College at Chiang Mai from 1928 to 1932. Deignan collected very few specimens during this period, but when he returned again during 1935-1937, he travelled extensively and explored the higher peaks in northern Thailand and throughout the country, collecting zoological specimens, especially birds. The mammals he collected were deposited in the Smithsonian Institution and have not yet been studied, except for bats (**Shamel**, 1942).

The Harvard University Asiatic Primate Expedition headed by **Harold J. Coolidge Jr.**, with personnel including **Adolph H. Schultz**, **C.R. Carpenter**, **Sherwood L. Washburn**, and **John A. Griswold, Jr.**, arrived in northern Thailand in early 1933. The expedition was primarily interested in the behavior of gibbons, resulting in the classic paper by **Capenter** (1940); the anatomy and variation of gibbons, resulting in the important paper by **Schultz** (1940), and the mammals of the mountains of northern Thailand, with results published by **Allen & Coolidge** (1940). The mammals collection is now at the Museum of Comparative



Zoology, and contains 4 species which were new to Thailand and 2 subspecies new to science.

Dr. Chote Suvatti published *Fauna of Thailand* in 1949 reporting 385 species and subspecies in the mammalian section. However, he listed only those mammals found in the scattered literature then present in Thailand and his list is far from completion. Besides recording many synonyms, at least 30 names were duplicated.

The Rush Watkins Zoological expedition to Siam headed by Colin C. Sanborn and Rush Watkins arrived in Thailand in 1949, primarily interested in securing a habitat group of tapir for the Field Museum of Natural History, Chicago. They worked at Khlong Khlung (Kamphaeng Phet), Nakhon Sawan, and Satun. Their specimens, including about 200 skins comprising 27 species, are now kept at the Field Museum of Natural History, and the collection was reported by SANBORN (1952).

Robert E. Elbel visited Thailand twice, working for the United States Scientific, Technical and Economic Mission in 1952-1955, and for the United States Operations Mission in 1961-1963. During his visits, he collected no less than 5000 specimens, of which about 25% were mammals. This collection is deposited at the Smithsonian Institution and has not yet been studied. During the second visit, Elbel concentrated only on the Peninsula, with most specimens going to the Bishop Museum in Hawaii; and again, most of this material has not been studied. Among Elbel's material, there are at least 2 new records for Thailand (*Taphozous crassus* and *Belomys pearsoni*), and two new subspecies have been described among the diurnal squirrels, the only group which has been studied, (*Callosciurus finlaysoni boonsongi* Moore & Tate, 1965 and *Tamias rodolphei elbeli* Moore, 1958).

Dr. Boonsong Lekagul started his collection about 1930, beginning with big game trophies. After 1952, when the larger mammals began to disappear due to habitat destruction and uncontrolled hunting with four-wheel-drive motor cars, spotlights, poisoned baits, and other unsporting methods, Dr. Boonsong turned his interest to birds and small mammals, and over 20 years collected the specimens which are now deposited at his house on Charoen Krung Road, Bangkok; the collections



are opened to the public as a gallery. Among the collections, he possesses the finest horns of Thai animals including some 40 pairs of deer's antlers, including the recently extinct *Cervus schomburgki*. Among the mammal skins, I estimated no less than 500 including some rare species. However, the mammals have not yet been studied.

The SEATO Medical Research Laboratory began its research in 1958, collecting mammals primarily to study arthropod-borne diseases. Well over 2000 skins and spirit specimens were collected and are now deposited at various institutions all over the world, including the Centre for Thai National Reference Collections, Applied Scientific Research Corporation of Thailand, Bangkok; the Smithsonian Institution, U.S. National Museum; American Museum of Natural History; Department of Biology, Tulane University; British Museum (Natural History); Faculty of Tropical Medicine, Bangkok; and the SEATO Laboratory in Bangkok.

The Royal Forest Department in Bangkok recently started a small collection, primarily as samples for game regulations. However, there is a rare mounted skin of *Cynogale bennetti* among the specimens.

The Centre for Thai National Reference Collections (CTNRC) of the Applied Scientific Research Corporation of Thailand began its collection in 1966, intending to build up a collection for a national museum and for reference purposes. Under the direction of the author, expeditions have been made to various parts of Thailand, returning with many significant specimens, including many new records for Thailand and several new species, mostly bats. Some results of this work have been pulished, some reports are in manuscript form, and some other works are in the initial stage of research.

Dr. Jack Fooden of the Field Museum of Natural History, Chicago, came to Thailand in January 1967 and stayed for four months, collecting primates in the western part of the country. His collection totalled 152 specimens of 9 species, including all five species of macaque. This work has so far resulted in many papers and will contribute to Fooden's revision of the genus *Macaca*. Although the bulk of Fooden's material is deposited in the Field Museum, a representative sample of skins and skulls were sent to CTNRC, reflecting the enlightened approach by Dr. Fooden and the Field Museum toward collections made in foreign countries.



## ACKNOWLEDGEMENTS

I wish to express my sincere thanks to the following persons who, in various ways, have provided assistance in completing this work: Dr. S. Dillon Ripley, Dr. George E. Watson, and Dr. Henry W. Setzer of the U.S. National Museum, Smithsonian Institution, for arranging the financial assistance for my visits to the United States and India; Dr. Boonsong Lekhagul for his personal communication with the British Ambassador, the Dutch Ambassador, the Swedish Ambassador, and Mr. Axel Axson Johnson, the Thai Consul in Stockholm, and the Danish Ambassador to Thailand to facilitate my entry to the above mentioned countries.

I am most grateful to Dr. Charles O. Handley, Mr. Duane A. Schlitter, Dr. Richard Thorington, Dr. Ralph Wetzell, Dr. Ron Pines, Mr. Thomas McIntyre, Miss Babara Harvey of the Department of Mammals, Smithsonian Institution; Dr. Clyde Jones, Dr. John Paradiso of the Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Washington D.C.; Dr. Richard Van Gelder, Dr. Sydney Anderson, Dr. Karl F. Koopman, Dr. Guy Musser, Dr. Hobert Van Duesen, Miss Patricia Freeman, Division of Mammals, American Museum of Natural History, New York; Dr. Joseph C. Moore, Dr. Jack Fooden, Mr. P. Herskovitz, Mr. Anthony de Blass, Dept. of Mammals, Field Museum of Natural History, Chicago; Dr. Barbara Lawrence, Museum of Comparative Zoology, Harvard University; Dr. J.P. Hardings, Dr. G.B. Corbet, Mr. John Edward Hill, British Museum (Natural History), London; Dr. A.M. Husson, Dr. G.F. Mees, Rijksmuseum van Natuurlijke Historie, Leiden; Dr. A.G. Johnell, the late Dr. Ulf Bergstrom, Naturhistoriska Riksmuseet, Stockholm; Dr. F.W. Braestrup, Zoologisk Institut, Copenhagen; Mr. J.C. Daniel, Dr. Salim Ali, Mr. Humayun Abdulali, Bombay Natural History Society, Bombay; Dr. V.C. Agrawal, Dr. B. Biswas, Zoological Survey of India, Calcutta; and the staff members of the above museums, institutions, and societies for their helpful cooperation during my stay.

Appreciation is expressed to Air Vice Marshal M.R. Sukshom Kashemsanta, Dr. Prasert Lohavanijaya, Dr. H.E. McClure, Dr. Niphan Ratanaworabhan, Mr. Jeffry McNeeley for their advice, criticism, and revision of the manuscript; and last, but not least, to Miss Apsorn Kaeo-amphorn for typing the manuscript.



## REFERENCES

- ALLEN, G.M. 1938-1940. The mammals of China and Mongolia. (2 vols.) (Natural History of Central Asia, vol. 11, pts. 1, and 2.) New York.
- ALLEN, G.M., and COOLIDGE, H.J. 1940. Mammal and bird collections of the Asiatic Primate Expedition. 1. Mammals. Bull. Mus. Comp. Zool. Harvard **87**: 121-211.
- ANDERSEN, K. 1905. On the Bats of the *Rhinolophus philippinensis* group with descriptions of five new species. Ann. Mag. nat. Hist. ser. 7, **16**: 243-257.
1921. Catalogue of the Chiroptera in the collection of the British Museum 1. Megachiroptera. London.
1918. Diagnoses of new bats of the families Rhinolophidae and Megadermatidae. Ann. Mag. nat. Hist. ser. 9, **2**: 374-384.
- ANDERSEN, J. 1881. Catalogue of Mammalia in the Indian Museum, Calcutta. Part 1. Primates, Prosimiac, Chiroptera, and Insectivora. Calcutta.
- BLANFORD, W.T. 1888-1891. Fauna of British India, including Ceylon and Burma. Mammalia (2 vols.) London.
- BLYTH, E. 1863. Exhibition of new deer from Siam. Proc. zool. Soc. Lond. **1863**: 155-158.
1875. A catalogue of mammals and birds of Burma. J. Asiat. Soc. Bengal **44** (extra number): 1-53, (opus posthumus).
- BONHOTE, J.L. 1900 *a*. On a collection of mamals from Siam made by Mr. T.H. Lyle. Proc. zool. Soc. London, **1900**: 191-195.
- 1900 *b*. On the mammals collected during the Skeat Expedition to the Malay Peninsula, 1899-1900. Proc. zool. Soc. London **1900**: 863-883.
1901. On a second collection of mammals made by Mr. T.H. Lyle in Siam. Proc. zool. Soc. London **1901**: 52-56.
1902. On further collection of mammals made Mr. T.H. Lyle in Siam. Proc. zool. Soc. London **1902**: 38-41.
1903. Anthropological and zoological results of an expedition to Perak and the Siamese Malay States, 1901-1902. Report on the mammals. Fasciculi Malayensis. Zool. **1**: 1-45.
- BUFFON, G.L. 1789. Histoire Naturelle. Vol. 2 Paris.
- CANTOR, T. 1846. A catalogue of Mammalia, inhabiting the Malayan and Island. J. Asiat. Soc. Bengal **15**: 171-203, 241-279.



- CARPENTRER, C.R. 1940. A field study in Siam of the behavior and social relations of the gibbon (*Hylobates lar*). *Comp. Psychol. Monog.* **16** (5) : 1-212.
- CHASEN, F.N. 1940. A handlist of Malaysian Mammals. *Bull. Raffles Mus.* **15** : 1-209.
- DEIGNAN, H.G. 1963. Checklist of the birds of Thailand. *Bull. U.S. natn. Mus.* **226** : 1-263.
- DOBSON, G.E. 1876. A monograph of the Asiatic Chiroptera. London.
- 1878 *a*. Catalogue of the Chiroptera in the British Museum. London.
- 1878 *b*. Notes on recent additions to the collection of Chiroptera in the Museum d'Histoire Naturelle at Paris with descriptions of a new and rare species. *Proc. zool. Soc. London* **1878** : 873-889.
- ELLERMAN, J.R. 1961. Fauna of India. Vol. 3, part 1 & 2 (Rodentia). Calcutta.
- ELLERMAN, J.R. and T.C.S. MORRISON-SCOTT, 1951. Checklist of Palearctic and Indian Mammals 1758 to 1946. London.
1955. Supplement to Chasen (1940), A handlist of Malaysian mammals. London.
- FLOWER, S.S. 1900. On the Mammalia of Siam and the Malay Peninsula. *Proc. zool. Soc. London* **1900** : 306-379.
- FORBES, E. (Edited by Dr. Bowdler Sharpe). 1894. Allen's Natural History Library, Vols. 1 & 2. London.
- GYLDENSTOLPE, N. 1916. Zoological results of the Swedish Expedition to Siam, 1911-1912 and 1914-1915. *K. svenska Vetensk Akad. Handl.* **57** (2) : 1-59.
1919. A list of the mammals at present known to inhabit Siam. *J. Siam Soc. nat. Hist. Suppl.* **3** : 127-175.
- HARRISON, J. 1966. An introduction to mammals of Singapore and Malaya. Singapore.
- HILL, J.E. 1960. The Robinson collection of Malayan Mammals. *Bull. Raffles Mus.* **29** : 1-112.
- HILL, J.E. & TONGLONGYA K. 1972. Bats from Thailand and Cambodia. *Bull. Brit. Mus. nat. Hist. (Zool.)* **22** (6) : 173-196.
- HORSFIELD, T. 1824. Zoological researches in Java. Unpaginated. London.
1851. A catalogue of the Mammalia in the museum of the Hon. East-India Company. London.
- KLOSS, C.B. 1915. Zoogeographical divisions for Siam. *J. Siam Soc. nat. Hist. Suppl.* **1** : 250-251.
- 1916 *a*. On a collection of mammals from Siam. *J. Siam Soc. nat. Hist. Suppl.* **2** : 1-32.

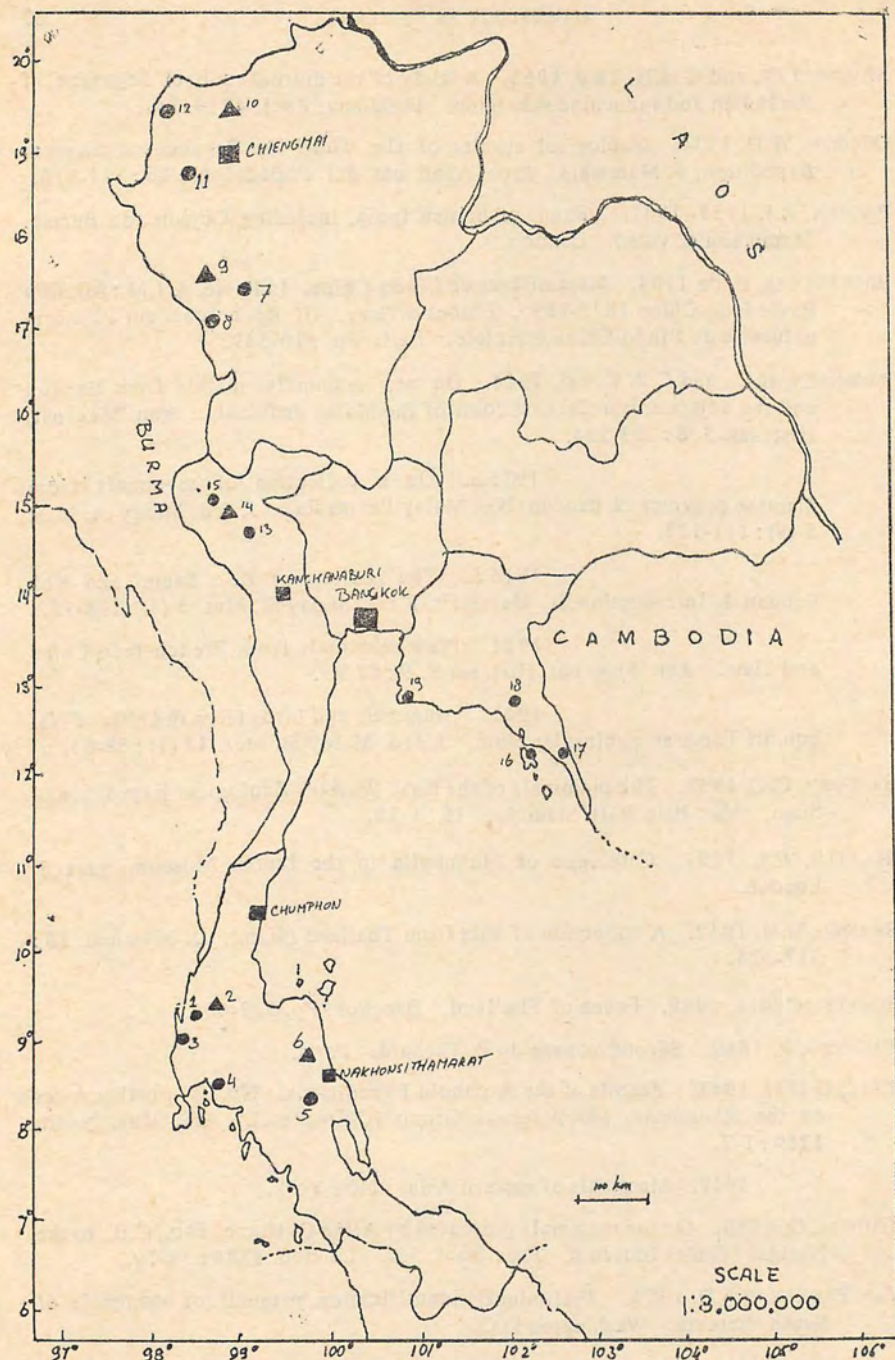


- KLOSS, S.B. 1916 *b*. On a collection of mammals from the coast and islands of southeast Siam. With an account of the fruitbats by Dr. K. Andersen, F.Z.S. Proc. zool. Soc. London **1916** : 27-75.
- 1917 *a*. On a new Murine genus and species from Siam. J. Siam Soc. nat. Hist. Suppl. **2** : 279-281.
- 1917 *b*. On a third collection of Siamese mammals. J. Siam Soc. nat. Hist. Suppl. **2** : 288-318.
- 1919 *a*. On a fourth collection of Siamese mammals. J. Siam Soc. nat. Hist. Suppl. **3** : 39-69.
- 1919 *b*. On mammals collected in Siam. J. Siam Soc. nat. Hist. Suppl. **3** : 333-407.
1921. Two new *Leggada* mice from Siam. J. Siam Soc. nat. Hist. Suppl. **4** : 59-63.
- KLOSS, C.B. and F.N. CHASEN, 1930. On mammals from Raheng Districts, western Siam. J. Siam Soc. nat. Hist. Suppl. **8** : 62-78.
- KOENIG, J.G. 1894. (A translation of Dr. J.G. Koenig's voyage to the oriental during 1778-1779). J. Straits Br. R. Asiat. Soc. **26** : 126-161.
- LEKAGUL, Boosong. 1968. Bird guide of Thailand. Bangkok.
- LYON, M.W., Jr. 1907. A new flying squirrel from the island of Terutau, west coast of Malay Peninsula. Proc. biol. Soc. Washington **20** : 17-18.
1911. Descriptions of four new tree-shrews. Proc. biol. Soc. Washington **24** : 167-170.
1913. Tree shrews; an account of the mammalian family Tupaiidae. Proc. U.S. natn. Mus. **45** (1976) : 1-88.
- MATSCHIE, P. 1899. Die Megachiroptera des Berliner Museums für Naturkund. Berlin.
- MEDWAY, LORD. 1969. The wild mammals of Malaya. Kuala Lumpur.
- MILLER, G.S., Jr. 1898. List of bats collected by Dr. W.L. Abbott in Siam. Proc. Acad. nat. Sci. Philadelphia **50** : 316-325.
1900. Seven new rats collected by Dr. W.L. Abbott in Siam. Proc. biol. Soc. Washington **8** : 137-150.
- MILLER, G.S., Jr. 1903. Seventy new Malayan Mammals. Smithson. misc. Collns. Q. issue, **1** : 1-73.
1913. Fifty-one new Malayan Mammals. Smithson. misc. Collns, **21** : 1-30.
- MILNE-EDWARDS, A. 1868. Les Mammifères. Paris.
- MOORE, J.C. 1958. New striped tree squirrels from Burma and Thailand. Am. Mus. Novit. **1879** : 1-6.



- MOORE, J.C., and G.H.H. Tate, 1965. A study of the diurnal squirrel Sciurinae, of the Indian and Indochina subregion. *Fieldiana. Zool.* **48**: 1-351.
- OSGOOD, W.H. 1934. Zoological results of the Third De Schauensee Siamese Expedition. 4. Mammals. *Proc. Acad. nat. Sci. Philadelphia* **86**: 311-316.
- POCOCK, R.I. 1939-1941. Fauna of British India, including Ceylon and Burma. Mammalia (2 vols.). London.
- POUSARGUES, E. de 1904. Mammifères de l'Indo-Chine. In Pavie, A.J.M.: Mission Pavie Indo-Chine 1879-1895. Etudes diverse. III. Recherches sur l'histoire naturelle de l'Indo-Chine orientale. Paris. Pp. 510-549.
- ROBINSON, H.C., and C.B. KLOSS, 1914. On new mammals, mainly from Bandon and the adjacent islands, east coast of the Malay Peninsula. *Ann. Mag. nat. Hist. ser. 3.* **8**: 223-234.
- 1915 a. On a collection of mammals from Siamese province of Bandon, NE. Malay Peninsula. *J. fed. Malay St. Mus.* **5** (5): 111-127.
- 1915 b. The zoology of Koh Samui and Koh Pennan. I. Introduction; II. Mammals. *J. fed. Malay St. Mus.* **5** (3): 128-152.
1922. New mammals from French Indo-China and Siam. *Ann. Mag. nat. Hist. ser 9.* **9**: 87-99.
1923. Mammals and birds from the hills of Nakhon Sri Tamarat, peninsular Siam. *J. fed. Malay St. Mus.* **11** (1): 58-63.
- SANBORN, C.C. 1952. The mammals of the Rush Watkins Zoological Expedition to Siam. *Nat. Hist. Bull. Siam Soc.* **15**: 1-20.
- SCLATER, W.L. 1891. Catalogue of Mammalia in the Indian Museum, part 2. London.
- SHAMEL, H.H. 1942. A collection of bats from Thailand (Siam). *J. Mammal.* **23**: 317-328.
- SUVATTI, CHOTE. 1949. Fauna of Thailand. Bangkok. Pp. 522-602.
- TACHARD, P. 1689. *Sécond voyage du P. Tachard.* Paris.
- TATE, G.H.H. 1943. Results of the Archbold Expeditions. No. 49. Further notes on the *Rhinolophus philippinensis* Group (Chiroptera). *Am. Mus. Novit.* **1219**: 1-7.
1947. Mammals of eastern Asia. New York.
- THOMAS, O. 1886. On the mammals presented by Allen O. Hume, Esq., C.B., to the Natural History Museum. *Proc. zool. Soc. London.* **1886**: 54-79.
- VAN PEENAN, P.F.D. 1969. Preliminary identification manual for mammals of South Vietnam. Washington D.C.





Map of Thailand showing localities, which has been visited during this expedition. The names of the localities are listed on the Itinerary.

- ▲ = mountain areas
- = lowland, slightly high on tableland areas